

POWEL NIMBUS

- OPERATIONAL IMPROVEMENTS IN VERSION 9.2.7

This document describes improvements and new functionality in Powel Nimbus developed as part of the Omega Phase 2, Part 1 project. One of the focus areas in this project has been to improve the operational use of Powel Nimbus, based on feedback from the pilot users in Omega Phase 1.

The second focus area of the Omega Phase 2, Part 1 project has been Intra-day Operations. Please note that the results of this work are described in a separate White Paper.



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SUPPORT FOR ROLES IN POWEL NIMBUS AND POWEL CONFIGURATION SYSTEM

The role support in Powel Nimbus allows each user to choose his/her role when starting Powel Nimbus. If the user is authorized for only one role, this role is chosen automatically when entering Powel Nimbus and the task list for this role will appear. If the user is authorized for several roles, the user has to choose role in the top leftmost part of the Nimbus screen, as shown below.

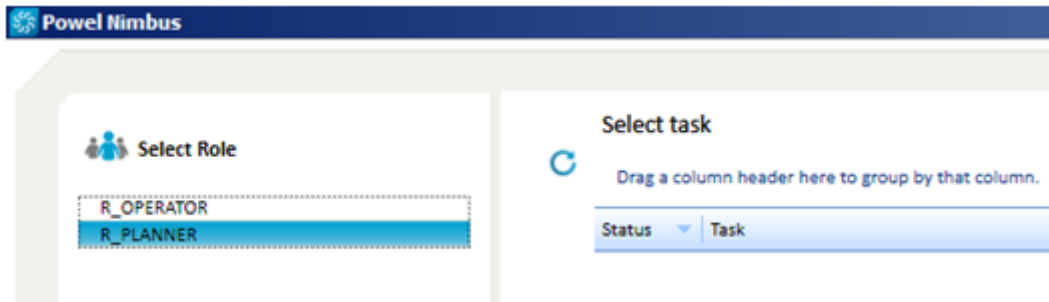


Figure: Choice of user role in Powel Nimbus

In this example, the user has been authorized both for the role R_OPERATOR and R_PLANNER. The user chooses his/hers current role by clicking in the list. Once the role has been chosen, the task list for that role will appear.

The different roles are defined in the Powel Configuration System by the system administrator in advance, as a special type of group. Users who are authorized for this role are then defined as members of the role group. Each user MUST be member of at least one role group, and MAY be member of several role groups (as in the above example).

Each role group is linked to a specific role-user in the Powel Configuration System. When a user enters Powel Nimbus and chooses a given role, the role-user is used to setup all configuration parameters in the Configuration System.

This means that the user's personal configuration settings will not be used; but rather the role-users configuration. The purpose of this behavior is that all users that work in a given role, should have exactly the same configuration setting while working in Nimbus.

PREDEFINED SEQUENCE OF STEPS IN POWEL NIMBUS TASK DEFINITIONS

When the system supervisor makes task definitions for Powel Nimbus, the sequence of the steps is now defined by means of so-called paths. This is done by means of "drag-and-drop" technique in the Nimbus configuration tool. For each step, the supervisor defines a) which step is the default next step and b) which steps are legal next steps. See example below.

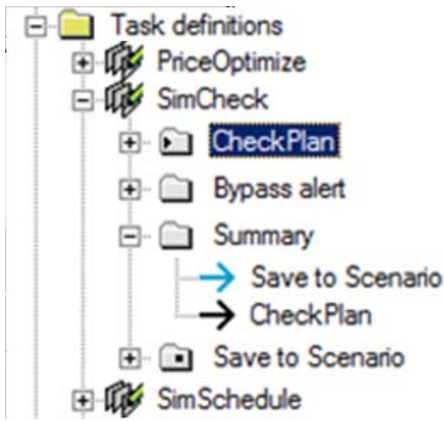


Figure: Definition of default and legal path for the “Summary” step

In this example, the supervisor has defined that for the “Summary” step, the “Save to Scenario” step is the default next step (marked with blue arrow). If the user clicks Next when in the “Summary” step, the “Save to Scenario” step will appear. However, the “Check Plan” step is also a legal next step. The user may go to the “Check Plan” step by clicking this step in the leftmost tree structure in Nimbus. While “Bypass alert” is not allowed, and hence grayed out in the tree structure:

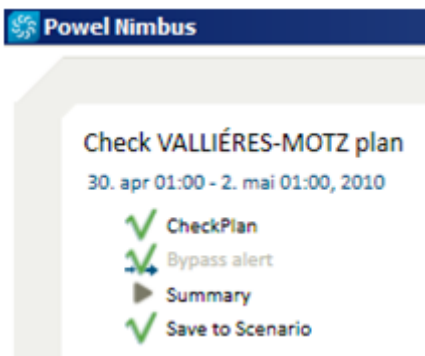
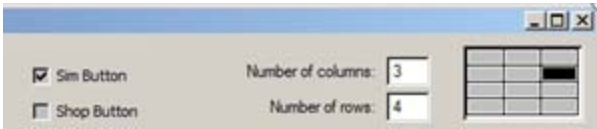


Figure: example of use of “path” in Powel Nimbus – note that “Bypass alert” is grayed out (not legal from “Summary”)

This way, the supervisor not only defines a bunch of steps within a work process, but also helps the user to do steps in the right sequence. As an example, the user should be steered towards steps for checking input data BEFORE entering an optimization step. Likewise, it does not make sense going to a step which presents the results from an optimization until AFTER the optimization step has been executed.

RUNNING OPTIMIZATION OR SIMULATION DIRECTLY FROM A REPORT STEP

This new feature is very useful when the user should fine-tune certain plans or other input data, and then see the consequence of the changes immediately. The supervisor may then define a report step with a built-in simulator or optimizer button. This is done simply by checking “Sim Button” or “Shop Button” in the configuration tool.



In the example below, the user may change plans for two power plants in the leftmost table. The charts in the second row show the current plan for each of the power plants (gray line) and the new plan entered by the user in the table (green line). Once the user changes the plan in the table, the green line is updated.

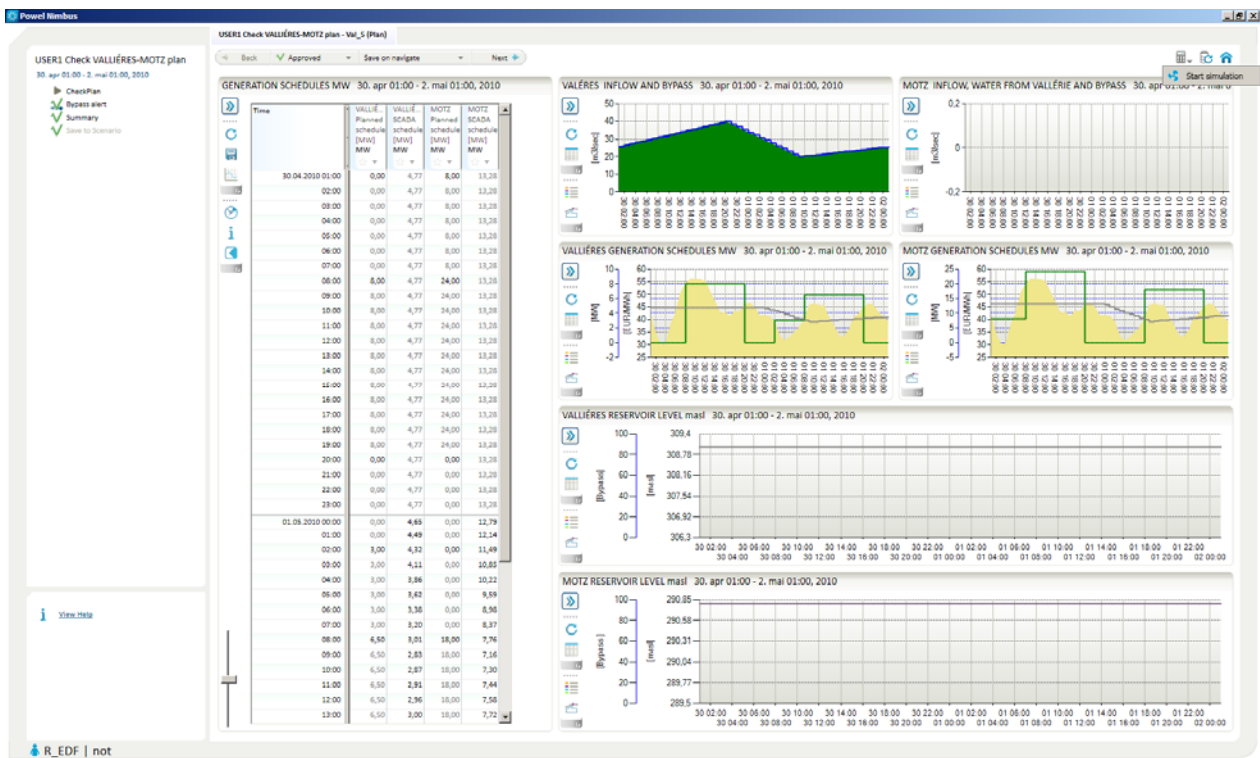


Figure: Planning step in Nimbus, before simulation with new plan (entered in the table) has been run

When the user press the “Start simulation” button in the upper right menu, simulation with the new plan is run immediately - without leaving the planning window. The new results are displayed in the planning window immediately, as shown in next figure.

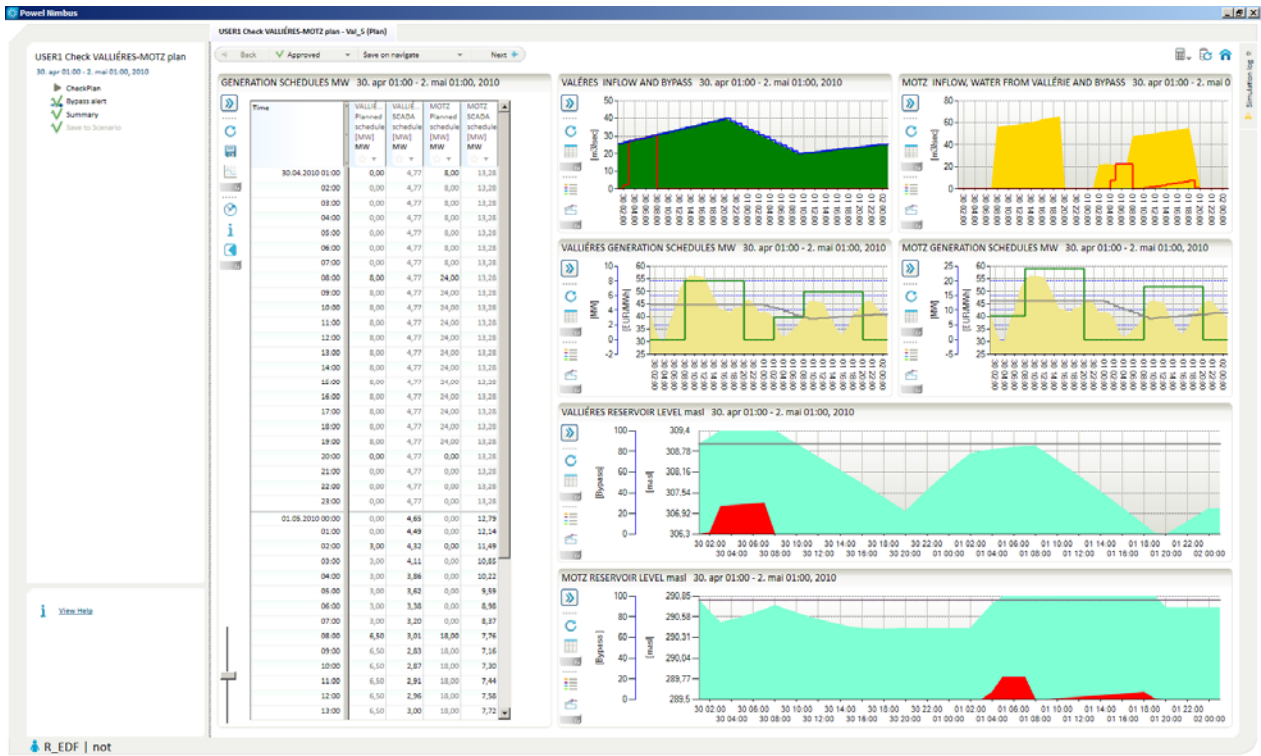


Figure: Planning step in Nimbus, after simulation has been run

The resulting reservoir levels are shown in the two lower charts, as aquamarine colored area charts. Any bypass or spillage is drawn as red colored area charts on top of the reservoir levels. This gives the user immediate feedback on the effect of the plan changes that are done in the table to the left.

If the simulation causes one or more warnings, a yellow triangle appears in the right margin (as in the example above). The messages from the simulator may then be inspected by clicking the triangle.

This way of re-simulating (or re-optimizing) without leaving the planning window makes it possible to analyze the consequences of plan changes quickly, in a very intuitive manner. Because all graphs are re-drawn within exactly the same window after each click on the simulator/optimizer button, it is visually very easy to see the consequences from plan changes.

ENTRY OF PLANS AND DATA ON MINUTE LEVEL IN NIMBUS TABLES

This feature is implemented in a similar way in Nimbus tables, as in the old Table module. E.g. if the table has one row per hour, the user click the hour in question and then a CTRL + command in order to expand the current hour. See example below.

Time	VALLIE Planned schedule [MW]	VALLIE SCADA schedule [MW]	MOTZ Planned schedule [MW]	MOTZ SCADA schedule [MW]
30.04.2010 01:00	0,00	4,77	8,00	13,28
02:00	0,00	4,77	8,00	13,28
03:00	0,00	4,77	8,00	13,28
04:00	0,00	4,77	8,00	13,28
05:00	0,00	4,77	8,00	13,28
06:00	0,00	4,77	8,00	13,28
07:00	0,00	4,77	8,00	13,28
08:00	8,00	4,77	24,00	13,28
09:00	8,00	4,77	24,00	13,28
10:00	8,00	4,77	24,00	13,28
11:00	8,00	4,77	24,00	13,28
>>> 11:35	8,00		24,00	
>>> 11:36	10		24,00	
>>> 11:37	10,00		24,00	
>>> 11:38	10,00		24,00	
>>> 11:39	10,00		24,00	
12:00	10,00	4,77	24,00	13,28
13:00	10,00	4,77	24,00	13,28

Figure: Changing the current plan from 8 to 10 MW at 11:36, by means of CTRL + expansion

The expansion is done from hourly to quarterly, then to 5 minutes and finally down to 1 minute. The >>> marker in the time axis indicates the current level of expansion (>>> means minute resolution etc).

This is useful e.g. to insert new plans after a secondary regulation trade, at the exact time which has been specified by the System Operator.

IMPROVED LAYOUT OF CHARTS

Among other improvements, the time and date format on the x-axis of different charts is now chosen based on the size and shape of the window where the chart is shown. This leaves more space for the chart itself, and improves readability.

FONT AND COLOR OF FIGURES IN TABLES

It is now possible to define the figure font and color to be shown in Nimbus tables, per column in the Report Definition in Powel Time Series calculator.

POWEL SMART GENERATION

Powel Nimbus is part of the Powel Smart Generation portfolio, which consists of integrated computation engines for forecasting, simulation and optimization.

The Powel Smart Generation portfolio also utilize Powel Time Series Manager, which will automatically collect, validate, correct, scale, sum and store input and output data in the database to be used in the hydropower generation process.

